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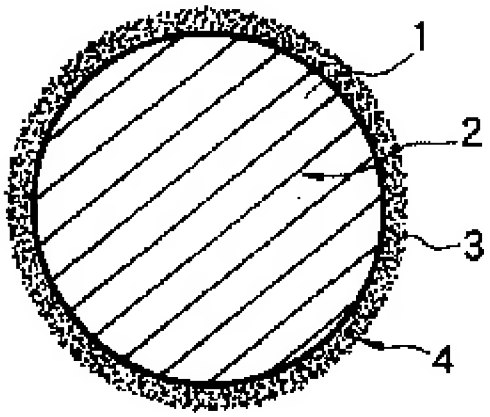
(54) [Title of the Invention] **Litter for processing animal waste**

(57) [Abstract]
[Purpose] The purpose of the present invention is to provide litter which is capable of quickly absorbing and retaining liquid contained in animal waste by means of its coating layer, of

actively deodorizing waste odor by means of its core silica-gel particle, and of absorbing liquid by means of its core; and in which the coating layer exhibits not only instantaneous effects relative to liquid absorption, but also simultaneously exhibits hard-clumping effects, so that the aforementioned silica-gel (core) clumps in coarse particles.

[Means for Solving the Problem**]** Litter for processing animal waste, which has one or a multiple number of porous Silica-gel 1 in coarse particles as Core 2, along with Water-absorbing Material 3, which exhibits hard-clumping effects while it is absorbing liquid, and which coats the aforementioned Core 2 as Coating Layer 4.



[Claims]

[Claim 1] Litter for processing animal waste, which has one or a multiple number of porous silica-gel in coarse particles as its core, along with a liquid-absorbing material, which exhibits hard-clumping effects while it is absorbing liquid, and which coats the aforementioned core as a coating layer.

[Claim 2] Litter for processing animal waste of Claim 1, in which the aforementioned liquid-absorbing material consists of liquid-absorbing polymer, starch, CMC, PVA, bentonite, or a mixture of such materials.

[Claim 3] Litter for processing animal waste of Claims 1, 2, and 3, in which the aforementioned coating layer contains a liquid-absorbing material, as well as organic fiber or organic fiber powder.

[Claim 4] Litter for processing animal waste of Claims 1, 2, and 3, in which the surface of the aforementioned core is partially exposed from the aforementioned coating layer.

[Detailed Explanation of the Invention]

[0001]

[Technological Field to which the Invention Belongs] The present invention relates to litter for processing animal waste for pets such as dogs and cats, experimental animals such as hamsters, guinea pigs, and rats, and in particular relates to the improvement of such litter for processing animal waste, utilizing silica-gel as a processing material.

[0002]

[Prior Art] Kokai Utility Model Application No. 5-80251 and Kokai Patent Application No. 8-119802 disclose litter for processing animal waste, in which silica-gel is utilized as litter for processing animal waste in the form of particles as they are without applying any particular treatment; or else silica-gel particles and liquid-absorbing polymer (in powder form) are mixed with paper sludge, and the mixture is converted into coarse particles.

[0003]

[Problem that the Invention is to Solve] The aforementioned silica-gel (product name) is superior in regards to moisture-absorption and odor control; therefore, it is often used, for example, as a desiccant for foods, such as sweets. Silica-gel is porous, and is in coarse particle form, with a diameter of 3mm; therefore, it is excellent in terms of its odor control and moisture-absorption properties—a result of its aforementioned porous structure.

[0004] The inventors of the traditional examples noticed such properties of silica-gel, and considered its utilization as litter for processing animal waste. However, when the aforementioned silica-gel is used without any treatment, it lacks the capability of absorbing large volumes of liquid, such as urine, which become discharged at one time. Consequently, urine flows into the bottom of the urinal or litter box, and is retained there.

[0005] The prior art did not recognize the fact that, although silica-gel is suitable as a moisture-absorbing material, it is not desirable for utilization as a liquid-absorbing material, which invites failure relative to meeting the requirements as litter for processing animal waste.
[0006] Furthermore, as observed in the latter example of the prior art, in the case of mixing fine silica-gel particles obtained by crushing particles of the same material with liquid-absorbing polymer and paper sludge, and by then converting the resulting mixture into coarse particles, the porous structural properties of silica-gel (moisture-absorption and odor control) cannot be fully activated. Moreover, the surface structure of the resulting material is such that the liquid-absorbing polymer particles are dispersed between the fine silica-gel particles; therefore, the properties of the liquid-absorbing polymer cannot be fully activated. Consequently, the coarse or pellet-like particles, which constitute the basic unit of such litters for processing animal waste, do not have clumping effects. The silica-gel particles on the surface hinder liquid-absorption, which thereby destroys the liquid-absorbing effects of the liquid absorbing polymer, as well as the clumping effects, as stated above.
[0007]
[Means for Solving the Problem] The litter for processing animal waste in the present invention contains coarse-particle silica-gel, with a porous structure, as the particle core.
[0008] Moreover, the coarse-particle silica-gel, which is used as the particle core as stated above, is designed so as to have a composite structure by being coated by a liquid-absorbing material, such as a liquid-absorbing polymer, which exhibits hard-clumping effects at the time it absorbs liquid.
[0009] For the aforementioned liquid-absorbing material, starch, PVA, CMC, bentonite, or a mixture of these can be utilized, besides the liquid-absorbing polymer.
[0010] Furthermore, a coating layer is formed on the aforementioned liquid-absorbing material by utilizing organic fiber, or a material consisting of a fiber powder mixture derived from such organic fiber.
[0011] Animal waste processing litter with a composite structure, consisting of the aforementioned core and coating layer, is designed so as to be in the form of coarse- or pellet-like particles, and is used by pouring its multiple particles into the bottom of a urinal or litter box.
[0012] When animals discharge their body waste, the coating layer which contains the liquid-absorbing polymer first quickly absorbs the liquid from the above-stated waste, and retains it within itself. The retained liquid is then gradually absorbed by means of the coarse-particle silica-gel of the porous structure being used as the core, which brings about the deodorizing effects.
[0013] Because the organic fiber, or the material consisting of a fiber powder mixture derived

from such organic fiber, is mixed in between the fine particles of the liquid-absorbing material to form the aforementioned coating layer, the coating layer becomes porous, and such porous property consequently increases the effects of the material relative to absorption responsiveness and liquid-retention. Furthermore, it enhances the deodorizing effects of the coarse-particle silica-gel used as the core, and also gradually activates the liquid-absorbing effects.

[0014] In addition, the aforementioned coating layer exhibits hard-clumping effects, due to the liquid-absorbing polymer's absorption of liquid and quick clumping of coarse-particles at the location where waste has been discharged. Thus, only the clumped portions are discarded and replaced with new litter; therefore, the portions in which liquid has been absorbed do not become dispersed, which is very economical.

[0015]

[Embodiments of the Invention] The aforementioned silica-gel is the product name of amorphous silicone dioxide hydrate ($SiO_2 \cdot mH_2O$), which is converted into coarse-particle form with a porous structure through a certain type of treatment. This is well known as a moisture-absorbing material. Its particle diameter ranges from 3 to 5mm, and it is shaped into ball-like, chunk-like, or short-particle-like shapes.

[0016] The aforementioned coarse-particle Silica-gel 1 with a porous structure is used as a Core 2; Core 2, consisting of such coarse-particle Silica-gel 1, is coated with Liquid-absorbing Material 3, which exhibits hard-clumping effects at the time it absorbs liquid, to form Coating Layer 4; thus, the litter in the present invention is designed so as to have a composite structure consisting of the aforementioned Core 2 and Coating Layer 4.

[0017] For the Liquid-absorbing Material 3 to form the aforementioned Coating Layer 4, the use of a liquid-absorbing polymer (in powder form) is appropriate. As Water-absorbing Material 3, starch, CMC (carboxymethyl-cellulose), PVA (polyvinyl chloride alcohol), bentonite, etc., in powder form, can be utilized, besides the liquid-absorbing polymer.

[0018] The aforementioned coarse-particle Silica-gel 1 to form Core 2 is designed to be a coarse particle, with a diameter ranging from 3 mm to 5mm, as shown in Figure 1. Moreover, it can be also designed to be a coarse particle consisting of 2 to 5 smaller particles, as shown in Figure 2.

[0019] The coarse-particle Silica-gel 1 is a particle with a multiple number of connected Air Holes 5, as shown in Figure 4.

[0020] In the case of forming Core 2 with a multiple number of coarse-particle Silica-gel 1, as another example of the present invention, powder or fiber made of pulp or paper is mixed in within the core (between the coarse-particle Silica-gel particles). Conceptually, examples of such include powder or fiber from paper sludge.

[0021] Furthermore, in another example of the present invention, a liquid-absorbing material, such as bentonite, is mixed in between the coarse-particle silica-gel particles. For the

aforementioned Coating Layer 4, a liquid-absorbing material, such as liquid-absorbing polymer (in powder form) is used by itself as a simple substance; as Water-absorbing Material 3, Mixture 6 of either Organic Fiber or Fiber Powder derived from such organic fiber is used.

[0022] Organic Fiber or Fiber Powder Mixture 6, mixed in within the aforementioned Coating Layer 4, consists of fiber or powder of pulp, paper manufactured from pulp, and paper sludge; or fiber or powder from lumber, tea leaves, coffee beans, corn grains, or soy beans.

[0023] In yet another example of the present invention, as shown in Figure 5, the surface of Core 2, which consists of the aforementioned coarse-particle Silica-gel 1, is partially exposed from the surface of Coating Layer 4, which consists of the aforementioned Water-absorbing Material 3, or which contains a mixture of organic fiber or fiber powder. Reference Numeral 7 in Figure 5 represents the portions which are exposed.

[0024] Exposed Portion 7 activates the deodorizing effects of the coarse-particle Silica-gel 1 of the porous structure, as well as the liquid-absorbing effects and hard-clumping effects of Coating Layer 4, consisting of Water-absorbing Material 3.

[0025]

[Effects of the Invention] According to the present invention, litter which is capable of quickly absorbing and retaining liquid contained in animal waste by means of its coating layer, of actively deodorizing waste odor by means of its core silica-gel particle, and of gradually absorbing liquid by means of its core, can be provided.

[0026] Moreover, the coating layer exhibits not only instantaneous effects relative to liquid absorption, effects but also simultaneously exhibits hard-clumping effects, so that the aforementioned silica-gel (core) clumps in coarse particles.

[0027] As a result, problems relative to the dispersion and retention of waste on the bottom of the urinal or litter box, and consequent soaking of large areas of silica-gel, can be effectively prevented; furthermore, only a minimal portion where waste has been discharged (the clumped portion) needs to be discarded, which is very economical.

[Brief Explanation of the Drawings]

[Figure 1] Figure 1 shows a cross-sectional view of a coarse particle as the basic unit of animal waste processing litter in a first embodiment of the present invention.

[Figure 2] Figure 2 shows a cross-sectional view of a coarse particle in a second embodiment of the present invention.

[Figure 3] Figure 3 shows a cross-sectional view of a coarse particle in a third embodiment of the present invention.

[Figure 4] Figure 3 shows an enlarged cross-sectional view of a coarse particle silica-gel, which forms the core of the aforementioned waste processing litter.

[Figure 5] Figure 5 shows a general view of a coarse particle as the basic unit of animal waste

processing litter in a fourth embodiment of the present invention.

[Explanation of Reference Numerals]

1: Coarse-particle Silica-gel

2: Core

3: Water-absorbing Material

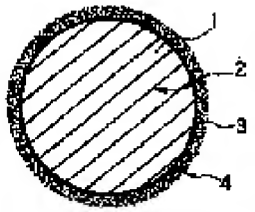
4: Coating Layer

5: Connected Air Hole

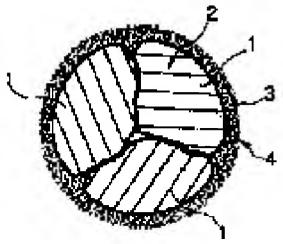
6: Organic Fiber or Fiber Powder Mixture 6

7: Exposed Portion

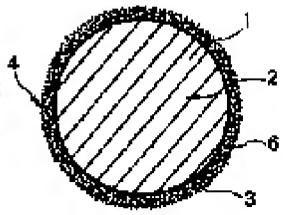
[Figure 1]



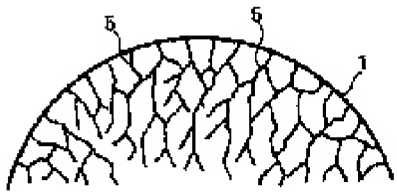
[Figure 2]



[Figure 3]



[Figure 4]



[Figure 5]